CLAIMS

What is claimed is:

1. A DC to DC power converter having an output comprising:

a control circuit which controls the output voltage; and

override control to the control circuit, responsive to a condition of the power converter or connected circuitry, to effect a minimum current limit.

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2. A power converter as claimed in claim 1 further comprising a controlled rectifier, the override control substantially eliminating negative current flow through the controlled rectifier.

Sub B1

3. A power converter as claimed in claim 2 wherein the override control increases the voltage output to effect the minimum current limit.

4. A power converter as claimed in claim 3 wherein the override control effects a fold-back or fold-forward minimum current limit.

5. A power converter as claimed in claim 3 wherein the condition to which the override control responds is a signal indicative of output current.

6. A power converter as claimed in claim 5 wherein the override control responds directly to sensed output current.

7. A power converter as claimed in claim 5 wherein the signal indicative of output current is a second current within the power converter.

Sub A2

8. A power converter as claimed in claim 7 wherein the signal indicative of output current is a sensed current through a controlled rectifier in the power converter.

9. A power converter as claimed in claim 8 wherein the signal indicative of output current is a current through an ORing transistor coupled to the output of the power converter.

10. A power converter as claimed in claim 3 further comprising disabling at least one controlled rectifier in the power converter circuit in response to decision logic.

11. A power converter as claimed in claim 10 wherein the at least one controlled rectifier which is disabled is an ORing transistor at the output of the power converter.

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12. A power converter as claimed in claim 3 wherein the minimum current limit is a negative current.

13. A power converter as claimed in claim 3 further comprising:

first and second primary transformer windings connected to a power source;

a secondary transformer winding circuit having at least one secondary winding coupled to at least one of the first and second primary windings;

plural controlled rectifiers, each having a parallel uncontrolled rectifier and each connected to a secondary winding, each controlled rectifier being turned on and off in synchronization with the voltage waveform across a primary winding to provide the output, each primary winding having a voltage waveform with a fixed duty cycle and transition times which are short relative to the on-state and off-state times of the controlled rectifiers; and

a regulator which regulates the output while the fixed duty cycle is maintained.

14. A DC to DC power converter comprising:

a controlled rectifier in a power circuit;

a connection impedance between a power circuit waveform and a control terminal of the controlled rectifier; and

hold-off circuitry that is activated to disable the controlled rectifier.

15. A power converter as claimed in claim 14 wherein the controlled rectifier is a synchronous rectifier in the power circuit.

16. A power converter as claimed in claim 14 wherein the controlled rectifier is in an ORing transistor at the output of the power converter.

17. A power converter as claimed in claim 14 wherein the connection impedance is in a completely passive circuit between the power circuit waveform and the control terminal of the controlled rectifier.

18. A power converter as claimed in claim 14 wherein the power circuit waveform is a voltage waveform and the controlled rectifier is implemented with a MOSFET.

19. A power converter circuit as claimed in claim 14 wherein the connection impedance comprises a capacitor.

20. A power converter as claimed in claim 19 wherein the connection impedance comprises a resistor in parallel with the capacitor.

21. A power converter as claimed in claim 14 wherein the connection impedance attenuates the power circuit waveform when the hold-off circuitry is deactivated.

22. A power converter as claimed in claim 21 further comprising a parallel impedance connected in parallel with the hold-off circuitry.

23. A power converter as claimed in claim 14 wherein the hold-off circuitry comprises a transistor between the control terminal and another terminal of the controlled rectifier to hold the controlled rectifier off when the transistor is on.

24. A power converter as claimed in claim 23 further comprising a diode in series with the transistor.

25. A power converter as claimed in claim 24 further comprising an impedance in parallel with the transistor and diode.

26. A power converter as claimed in claim 14 wherein a waveform having a negative average is produced at the control terminal of the controlled rectifier when the hold-off circuitry is activated and, when the hold-off circuitry is deactivated, the waveform average applied to the control terminal increases slowly.

27. A power converter as claimed in claim 14 wherein the hold-off circuitry is activated by an enable/disable input signal from decision logic.

28. A power converter as claimed in claim 27 wherein the hold-off circuitry is activated when the power converter is shut down.

29. A power converter as claimed in claim 27 wherein the hold-off circuitry is activated in response to an indication of low output voltage from the power converter.

30. A power converter as claimed in claim 27 wherein the hold-off circuitry is activated in response to an indication of low output current from the power converter.

31. A power converter as claimed in claim 27 wherein the hold-off circuitry is activated during startup of the power converter.

32. A power converter as claimed in claim 27 wherein the hold-off circuitry is activated during a turn-off transient of the power converter.

33. A power converter as claimed in claim 27 wherein the hold-off circuitry is activated in response to an external signal.

34. A power converter as claimed in claim 27 wherein the hold-off circuitry is activated in response to an indication that the waveform at the control terminal of the controlled rectifier will not result in correct drive.

35. A power converter as claimed in claim 34 wherein the hold-off circuitry is activated in response to a low voltage from a regulation stage of the power converter.

36. A power converter as claimed in claim 14 further comprising:

first and second primary transformer windings connected to a power source;

a secondary transformer winding circuit having at least one secondary winding coupled to at least one of the first and second primary windings;

plural controlled rectifiers, each having a parallel uncontrolled rectifier and each connected to a secondary winding each controlled rectifier being turned on and off in synchronization with the voltage waveform across a primary winding to provide the output, each primary winding having a voltage waveform with a fixed duty cycle and transition times which are short relative to the on-state and off-state times of the controlled rectifiers; and

a regulator which regulates the output while the fixed duty cycle is maintained.

37. A DC to DC power converter comprising:

a controlled rectifier responsive to a control waveform applied to a control terminal;

decision logic that generates an enable/disable signal to disable the controlled rectifier; and

a circuit responsive to the enable/disable signal to gradually change the degree to which the controlled rectifier is turned on or off such that a substantial momentary deviation in the output voltage is avoided when the controlled rectifier is enabled or disabled.

38. A power converter as claimed in claim 37 wherein the control waveform is provided passively from a power circuit waveform of the power converter.

39. A power converter as claimed in claim 38 further comprising:

a connection impedance between a power circuit waveform and the control terminal of the controlled rectifier; and

hold-off circuitry that is activated to disable the controlled rectifier.

40. A power converter as claimed in claim 39 further comprising:

first and second primary transformer windings connected to a power source;

a secondary transformer winding circuit having at least one secondary winding coupled to at least one of the first and second primary windings;

plural controlled rectifiers, each having a parallel uncontrolled rectifier and each connected to a secondary winding each controlled rectifier being turned on and off in synchronization with the voltage waveform across a primary winding to provide the output, each primary winding having a voltage waveform with a fixed duty cycle and transition times which are short relative to the on-state and off-state times of the controlled rectifiers; and

a regulator which regulates the output while the fixed duty cycle is maintained.

41. A power converter as claimed in claim 37 wherein the controlled rectifier is disabled when the power converter is shut down.

42. A power converter as claimed in claim 37 wherein the controlled rectifier is disabled in response to an indication of low output voltage from the power converter.

43. A power converter as claimed in claim 37 wherein the controlled rectifier is disabled in response to an indication of low output current from the power converter.

44. A power converter as claimed in claim 37 wherein the controlled rectifier is disabled during startup of the power converter.

45. A power converter as claimed in claim 37 wherein the controlled rectifier is disabled during a turn-off transient of the power converter.

46. A power converter as claimed in claim 37 wherein the controlled rectifier is disabled in response to an external signal.

47. A power converter as claimed in claim 37 wherein the controlled rectifier is disabled in response to an indication that the waveform at the control terminal of the controlled rectifier will not result in correct drive.

~~48. A power converter as claimed in claim 47 wherein the controlled rectifier is disabled in response to a low voltage from a regulation stage of the power converter.~~

49. A power converter as claimed in claim 37 wherein the control waveform has a negative average when the controlled rectifier is disabled.

50. A power converter as claimed in claim 49 wherein the time over which the average of the control waveform changes is determined by a resistive/capacitive circuit between the control terminal and a power circuit waveform.

51. A power converter as claimed in claim 37 wherein the time over which the average of the control waveform changes is determined by a resistive/capacitive circuit between the control terminal and a power circuit waveform.

52. A DC to DC power converter comprising:

a controlled rectifier responsive to a control waveform applied to a control terminal;

decision logic that generates an enable/disable signal to disable the controlled rectifier when a waveform presented to the control terminal of the controlled rectifier will not result in correct drive.

53. A power converter as claimed in claim 52 wherein the controlled rectifier is disabled in response to a low voltage from a regulation stage of the power converter.

54. A power converter as claimed in claim 52 wherein the controlled rectifier is disabled in response to a low power rail.

55. A power converter as claimed in claim 52 wherein the controlled rectifier is disabled in response to a waveform within the power circuit from which the control waveform applied to the control terminal is obtained.

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56. A method of converting DC to DC power comprising:

controlling an output voltage through a control circuit; and

overriding control to the control circuit to effect a minimum current limit.

57. A method as claimed in claim 56 wherein negative current flow through a controlled rectifier is substantially eliminated.

58. A method as claimed in claim 57 wherein the voltage output is increased to effect the minimum current limit.

59. A method as claimed in claim 58 wherein the override is in response to a signal indicative of output current.

60. A method of converting DC to DC power comprising:

providing a connection impedance between a power circuit waveform and a control terminal of a controlled rectifier in the power circuit; and

activating hold-off circuitry to disable the controlled rectifier.

61. A method as claimed in claim 60 wherein the connection impedance attenuates the power circuit waveform when the hold-off circuitry is deactivated.

62. A method as claimed in claim 60 wherein the hold-off circuitry comprises a transistor between the control terminal and another terminal of the controlled rectifier to hold the controlled rectifier off when the transistor is on.

63. A method as claimed in claim 62 wherein the hold-off circuitry further comprises a diode in series with the transistor.

64. A method as claimed in claim 63 further comprising providing an impedance in parallel with the transistor and diode.

65. A method as claimed in claim 60 further comprising producing a waveform having a negative average at the control terminal of the controlled rectifier when the hold-off circuitry is activated and, when the hold-off circuitry is deactivated, slowly increasing the waveform average applied to the control terminal.

66. A method as claimed in claim 60 further comprising activating the hold-off circuitry by an enable/disable input signal from decision logic.

67. A method as claimed in claim 66 wherein the hold-off circuitry is activated in response to an indication that the waveform at the control terminal of the controlled rectifier will not result in correct drive.

68. A method as claimed in claim 67 wherein the hold-off circuitry is activated in response to a low voltage from a regulation stage of the power converter.

69. A method of converting DC to DC power comprising:

controlling a controlled rectifier in response to a control waveform applied to a control terminal of the controlled rectifier;

generating an enable/disable signal in decision logic to disable the controlled rectifier; and

in response to the enable/disable signal, gradually changing the degree to which the controlled rectifier is turned on or off such that a substantial momentary deviation in the output voltage is avoided when the controlled rectifier is enabled or disabled.

70. A method as claimed in claim 69 wherein the control waveform is provided passively from a power circuit waveform of the power converter.

71. A method as claimed in claim 70 further comprising:

providing a connection impedance between a power circuit waveform and the control terminal of the controlled rectifier; and

activating hold-off circuitry to disable the controlled rectifier.

72. A method as claimed in claim 69 wherein the controlled rectifier is disabled in response to an indication that the waveform of the control terminal of the controlled rectifier will not result in correct drive.

73. A method as claimed in claim 72 wherein the controlled rectifier is disabled in response to a low voltage from a regulation stage of the power converter.

74. A method as claimed in claim 69 wherein the control waveform has a negative average when the controlled rectifier is disabled.

75. A method of converting DC to DC power comprising:

controlling a controlled rectifier responsive to a control waveform applied to a control terminal of the controlled rectifier; and

generating an enable/disable signal in decision logic to disable the controlled rectifier when a waveform presented to the control terminal of the control rectifier will not result in correct drive.

76. A method as claimed in claim 75 wherein the controlled rectifier is disabled in response to a low voltage from a regulation stage of the power converter.